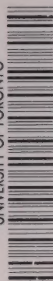


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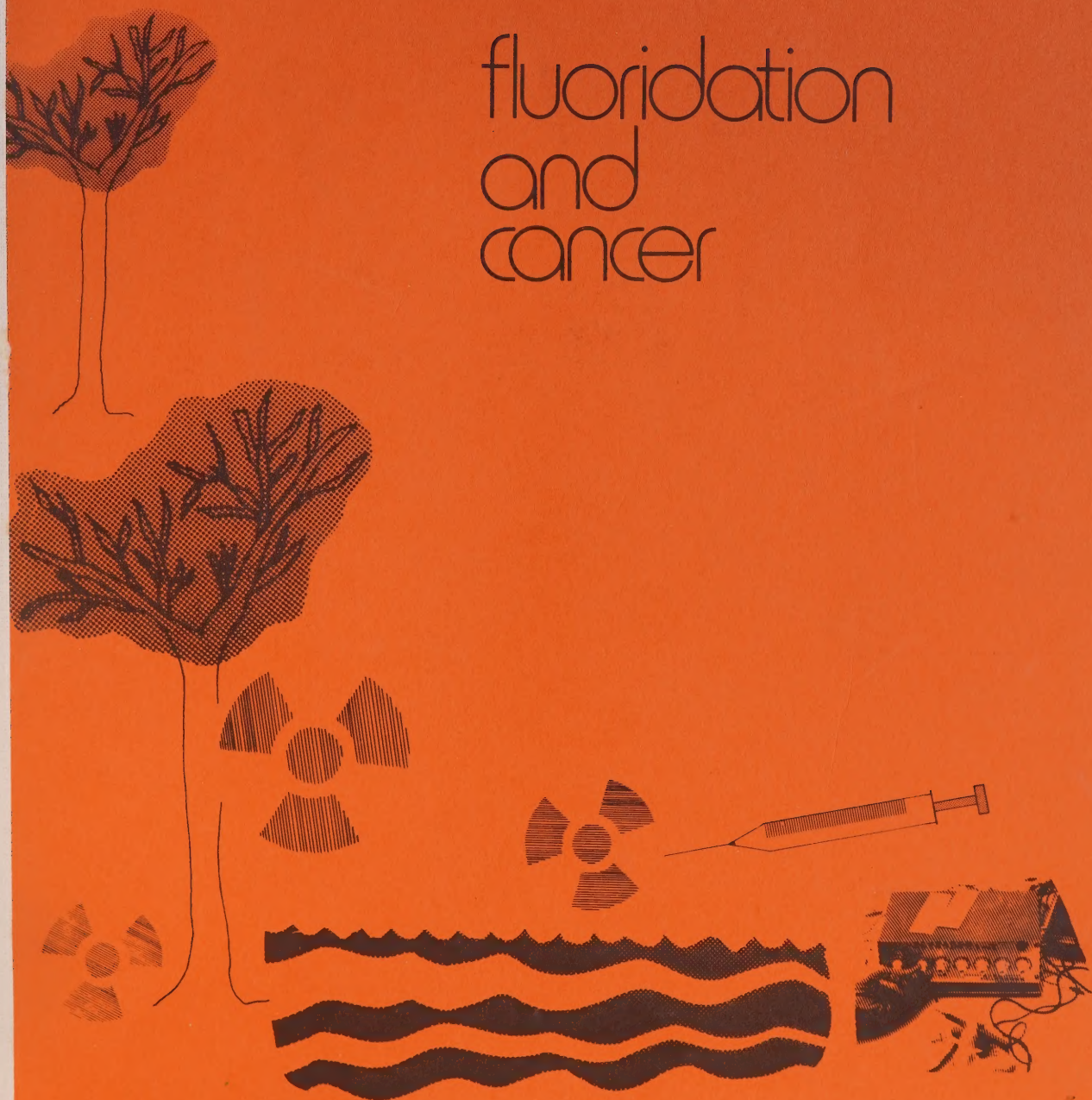
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FLUORIDATION AND CANCER

AN ANALYSIS OF CANADIAN DRINKING
WATER FLUORIDATION AND CANCER MORTALITY DATA

Environmental Health Directorate
Health Protection Branch

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ABSTRACT

A study, encompassing seventy-nine groups of municipalities throughout Canada, was undertaken to determine if fluoridation of water supplies enhances the risk of death from cancer for residents within those areas. The period covered was from 1954-73 inclusive and comparisons for death rates from cancer were made between fluoridated and non-fluoridated municipality groups. In addition to all neoplasms and all malignant neoplasms, other specific tumour sites of interest were: all forms of leukemia; malignant neoplasms of the respiratory system; malignant neoplasms of the small and large intestines, rectum, and rectosigmoid function; and malignant neoplasms of the stomach. Comparisons were made within groups of municipalities fluoridated at about the same time for death rates from all neoplasms and all malignant neoplasms.

No appreciable differences in death rates from all types of cancer or any specific tumour site were indicated between fluoridated and non-fluoridated municipalities over this period. Nor were any significant differences apparent between death rates from all types of cancer when compared within the same group of municipalities prior to and after fluoridation.

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This report was a combined effort of the following authors:

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Fluoridation of public drinking water supplies is a public health measure which has aroused a great deal of controversy in many countries of the world. The benefits of fluoridation in terms of reduced incidence of dental caries in those regions where the naturally-occurring levels of fluoride in water are below approximately 1 mg/litre are well established but many remain opposed to the practice for various reasons, including fears that long-term intake of trace quantities of fluoride may cause deleterious effects on health.

In 1975, it came to our attention that an organization in the United States known as the National Health Federation had claimed that a relationship exists between fluoridation of drinking water and increased incidence of cancer among those consuming the water. The National Health Federation is a private organization, the primary role of which appears to be to lobby intensively against fluoridation.

In support of the allegation that fluoridation causes cancer, the National Health Federation has published brochures summarizing studies attributed to Yiamouyiannis in which mortality rates from cancer were compared for the ten largest cities in the United States in which no fluoride is added to the water. Subsequently, Dr. Dean Burk has used similar data at a number of public meetings, many of which have received considerable publicity (1, 2). Unfortunately, neither of these individuals has published full details of their investigations in scientific or medical journals so that it is difficult to assess the scientific validity of their conclusions.

However, Yiamouyiannis and Burk based their conclusions on statistical information published by the National Cancer Institute in the United States. Statisticians of the National Cancer Institute have carefully analyzed the same information and were unable to reach similar conclusions; they pointed out that marked differences existed between the two groups of cities in terms of population, age, race and sex and these had been overlooked(3). Other groups of statisticians and epidemiologists have subsequently examined the same data and reached similar conclusions to those reached by officials of the U.S. National Cancer Institute. Of particular note are studies conducted by Oldham and Newell(4) on behalf of the Royal Statistical Society of Great Britain, and by Doll and Kinlen(5). Additional shortcomings in the statistical methods used by Burk and Yiamouyiannis have recently been published(6, 7).

The purpose of the investigation reported here is to examine data for cancer mortality in Canada in relation to the known history of fluoridation in this country. This has been accomplished by a retrospective study of cancer mortality in one hundred Canadian cities during the period 1954 to 1973.

CRITERIA FOR DATA COLLECTION AND GROUPING

2.1 General

Population values in (8) were used as a basis for selection of municipalities, to be used in this study. The most populous areas from this publication were selected from Table 8: Population for Census Metropolitan Areas with Components, Table 9: Population for Census Agglomerations of 25,000 Population and Over with Components, and Other Individual Municipalities with a Population of 25,000 and Over.

The population cancer death data for this study were supplied by the Health Division of Statistics Canada. The original list contained age and sex-specific population data for about 400 municipalities for the four census years 1956, 1961, and 1966 and 1971, and number of deaths for ICDA codes 140-239, for the years 1954-73, by age and sex. These data were then summarized and prepared in three ways:

1. the population and death data were assembled into ten-year age groups
2. the original list of municipalities were combined into the 100 municipal areas shown in Appendix B, Table B1
3. the ICDA codes were grouped into eighteen special categories, representing tumour sites and groups of sites.

2.2 Municipal Groupings

Within a Census Metropolitan Area or an Agglomeration, two subareas are listed; namely, the Urbanized Core, and the Fringe. The former contains the built-up densely populated section of the area, whereas the latter contains the more sparsely populated sections and generally includes wide areas of vacant land. Generally, it was only the urbanized core which was chosen as the area of study. Certain sections of the fringe were also included though if (a) a particular municipality of 25,000 or over lay in this subarea or (b) a portion of a municipality listed in the urbanized core lay in the fringe. A list of these areas and their groupings are to be found in Appendix B, Table B1. Groupings were made within Metropolitan areas or Agglomerations on the basis of fluoridation status and time of fluoridation as shown in Appendix B, Table B1. The initials NF in this table mean

Non-Fluoridated at the time of the 1971 Census. For some municipalities where the times of fluoridation differed only by a few months (say, less than one year), they were all placed in a single group. In cases such as these, the month and year of fluoridation may be given for each municipality, or, in groups which contain a large number of municipalities, only the earliest and latest times will be shown in Table B1. Since the groupings were performed on status and time of fluoridation, municipalities within a group may not be contiguous. This fact is particularly evident in large metropolitan areas like Montreal and Toronto.

2.3 Population Data

Appendix B, Table B2 shows the total population by sex for the groups in Table B1 for the four Census Years 1966-71. The figures for each of the four years refer to the topographical areas delineated at the time of the 1971 Census. It must be remembered that populations, boundaries of central cities, and boundaries of metropolitan areas and agglomerations often change between Census years and thus affect cancer and other death rates in significant ways. First of all, new housing developments produce rapid population increases in short periods, thus creating new suburbs. Secondly, some outlying suburbs unite with the central city which enlarges the central city's boundaries, or several small suburban municipalities may unite to form one large municipality under a new name. For this reason, population figures in this table may not agree with published figures in Census volumes for 1956, 1961 or 1966, either for the central city or the metropolitan area.

In 1956, population figures were produced only for municipalities of 10,000 and over, whether or not they be central cities or suburbs of larger areas. Consequently, the initials NA (Not Available) appear for many groups. Also with figures for many small suburban areas missing, the figures in Table B2 for many groups in 1956 may appear abnormally small compared with the other Census years.

2.4 Death Data

Age adjusted death rates for total malignant neoplasms are shown in Appendix B, Table B3, for the 100 municipal groups in Table B1, and are shown for the four Census years. There are certain factors in the data

which can have a significant effect on the cancer death rates in a particular municipality or group of municipalities between Census years. First of all, deaths refer to the municipality of usual residence at the time of death. The number of years of residence prior to death is unknown. A person with a lengthy terminal illness may decide to reside in a new community prior to impending death in order to get improved medical attention, or an institution housing patients may disappear between Census periods. A second factor which influences the death rate is a change in the age composition of the suburban area resulting from a new housing development which attracts many young married couples. Another problem occurs with wide fluctuations in death rates because of very small number of deaths based on small populations. However, many such communities were under 10,000 in 1956 and were thus omitted from the study.

Due to rapid changes in population and municipal boundaries for the components of some of the Census agglomerations between Census years, it was sometimes not possible to obtain comparable numbers of cancer deaths and population figures for certain groups of municipalities. The vast majority of these areas were in the peripheral sectors of certain municipalities in British Columbia where, because of the nebulous distinction between the urbanized core and the fringe, many small, sparsely populated areas were included in these groups. Populations and death rates for these areas have been listed as Not Available, and the analysis for cancer mortality has been omitted.

Certain regions, notably regions 21 and 23 in the Montreal area, which showed extreme values in cancer death rates in 1956, were still included in the study. The consequent effect would be to decrease the sensitivity of the results by increasing the overall variability of the data.

Apart from data collection, another factor which can affect the death rates is the classification change in ICD codes from the seventh to the eighth revision in 1969. Even though a list of comparable code numbers was released when the eighth revision occurred, absolute comparability was not always possible for the various cancer sites. Therefore, data for the sites which were least affected by the classification changes were selectively examined.

STATISTICAL ANALYSIS

Age-sex-specific populations were given for the regions in Table B2 for, and only for, the four Census years: 1956, 1961, 1966 and 1971. The cancer deaths for these regions were assembled by sex into ten-year age groups, and within each age-sex group, the figures were totalled for the five-year period around each Census year; namely, 1954-58, 1959-63, 1964-68 and 1969-73. Quinquennial age-adjusted and sex-specific mortality rates were then calculated for each region using the 1971 Canadian male or female population, respectively, as the standard population, and the Census population for a particular region as an average for the period. The age-adjusted rates for the regions for all malignant neoplasms, ICDA 140-209, for the four Census periods are shown in Appendix B, Table B3. The age-adjusted rate may be interpreted as the estimate of probability of an individual dying from any malignant neoplasm during the five-year period centred around the Census year, provided the percentage population composition of the region was made similar to that of all Canada in 1971. Since the population of the regions are sufficiently large ($\sqrt{10,000}$) the sampling variation of the estimates has been neglected.

Four sets of regions were formed by grouping them according to the date of fluoridation as follows: up to and including 1958 (Group I), 1959-63 (Group II), 1964-68 (Group III) or 1969-73 (Group IV). We have included only those regions into these groups for which the population data separately by sex were available for all the four Census periods. The composition of the groups is shown in Table 1, the percentage distribution of the population by age for males and females in 1971 for the four groups, combined non-fluoridated regions and for all Canada is shown in Tables 2 and 3. The study population comprises 56.7% of male and 58.4% of female Canadian population during 1971 Census period. It is seen that there is a slight excess of females over males in all four groups and non-fluoridated regions. The female proportions exceed the males in all cases from 50 years and beyond, and the reverse is true in the below 20-age group. Although the deviation of the population composition in each group is small when compared to the national figures, they still emphasize the need for age-standardization of the rates.

To ascertain whether fluoridation increases death from cancer, it is first necessary to examine death rates in communities prior to and after the introduction of fluoridation. For each of the four fluoridated groups in Table 1, the model in Appendix A analyzes the cancer death rates for the four Census periods and also tries to locate an increasing trend among periods if one exists. The next step after this analysis is to look at each fluoridated and non-fluoridated group separately and compare the cancer mortality rates with those for Canada as a whole. These relationships will be illustrated for all neoplasms and for each of the four Census periods in Table 6 and 7.

Analysis of variance according to the model (Appendix A) was performed on the age-adjusted cancer mortality rates for all neoplasms, ICDA 140-239 and all malignant neoplasms, ICDA 140-209, and the results are summarized in Table 4. The variation among the Census periods is not statistically significant for all four groups. The variation between the regions is statistically significant for males in Group I and for females in Group III and for malignant neoplasms in Group I. This is, of course, the consequence of the large range of regional variation among the adjusted cancer rates as seen from Appendix B Table B3. Some of these variations could be explained by the urban-rural differentials and sources of other geographic variation as have been observed in the U.S.(9, 10). The provincial variations of the age-standardized mortality rates from cancer for different sites in Canada have been documented(11). Table 4 also shows that the trend in the age-adjusted rates over the Census periods is significant for Group III males and for Group I for malignant neoplasms for females. The decreasing pattern in Group I females and the increasing pattern for Group III males are consistent with those observed for all Canada(11).

If fluoridation enhances cancer risk, then the age-adjusted cancer rates after fluoridation for a region should be higher than those before fluoridation and the differences between the after and before rates should increase with time after fluoridation. These assumptions have been formalized into a mathematical model (Appendix A), and it is shown that the Wilcoxon Matched Pair Signed Ranks Test would be an appropriate non-parametric test for the null hypothesis of no effect of fluoridation on cancer mortality. A non-parametric test was chosen to avoid any artefacts due to distributional

assumptions. The results for ICDA 140-239 and ICDA 140-209 are summarized in Table 5. Statistically significant results are obtained for the paired comparisons for females in Groups II and IV and for males in Group III. The results for Group II females indicate a decrease in cancer rates with fluoridation while the other two support an increase. In the absence of consistency of effects in both the sexes and among the groups, we feel inclined to reject the hypothesis that fluoridation increases cancer risk.

Since the heterogeneity among the regions within the groups as seen from the analysis of variance is not very large (Table 4), the cancer deaths were pooled and age-specific mortality rates were calculated for each of the four groups and non-fluoridated regions separately for males and females for the four Census periods. These rates and the age-specific rates for Canada, along with the direct age-standardized rates, using 1971 Canadian population for the appropriate sex and the Standardized Mortality Ratio (SMR) are shown in Tables 6 and 7. The SMR was calculated as the ratio of observed to the expected deaths in each group; the expected deaths were obtained by applying the Canadian age-sex specific rates for the corresponding centred Census year to the combined population of the regions for each sex in the group. If cancer risk from fluoridation is dose-related, then there should be a declining trend in these data from Group I, with maximum duration of fluoridation to the non-fluoridated. Evidently, there is no detectable declining pattern for any of the Census period in the age-specific mortality rates, age-adjusted mortality rates or the SMR. A double asterisk indicates those SMR's which were found to be significantly different from unity at the 99% level and a single one is given for the 95% level. For males, 12 of the 20 SMR's show significantly high values at the 99% level, and for females, 8 show high significance at the 99% level and 1 at the 95%(12). No regular pattern is shown for the significant differences, and ironically, in every case, the non-fluoridated group shows abnormally high SMR's. With a few exceptions among the females, the SMR's are consistently higher than unity.

DISCUSSION AND CONCLUSIONS

Fluoridation was first introduced in Canada in 1945 in the City of Brantford, Ontario. The next to commence fluoridation was Sudbury in 1952. Over the next two decades, a large number of municipalities introduced this practice (see Appendix B) until, today, about 8.6 million Canadians are supplied with water in which the level of fluoride has been adjusted to that which is optimal for good dental health.

In this investigation, we were unable to conclude that fluoridation of drinking water in Canada has increased the risk from cancer. In 1977, Cecilioni(13) has completed an unpublished study dealing with the incidence of cancer in 49 Ontario cities in relation to water fluoridation. We understand that our conclusions are at variance with those of Dr. Cecilioni insofar as we observed no selective pattern associated with fluoridation which is consistent in both sexes and related to the duration of fluoridation.

The results of the analysis of variance and the pattern of age-specific rates are, in general, in conformity with the published results for all Canada(11).

The variations between the Census periods did not attain statistical significance in any of the groups. The least significant difference (LSD) that could be detected with 95% confidence between the mean differences in each group, expressed as a percentage of the Canadian cancer mortality rate for males and females for 1971, is shown in Table 8. The figures indicate, for example, that if fluoridation were responsible for a quantum jump of 7.6% of the 1971 cancer rates for females, over the mean rates for the non-fluoridated years in Group III, it would have been detected with 95% probability by the analysis of variance. From grounds of biological plausibility, it may be postulated that the cancer risk from fluoridation, if present, would be dose-related. The absence of a consistent trend by analysis of variance and among the age-specific or age-adjusted rates or SMR for the pooled regions within the groups lead us to concur with the conclusion arrived at by the Royal College of Physicians(14) that fluoridation does not increase the cancer risk of the population.

As indicated by the SMR's, age-adjusted death rates from all neoplasms are generally higher than that for Canada in all groups of study, including the non-fluoridated. The population included in this study comprises about

58% of the Canadian total as shown in Table 2 and 3, and it is all concentrated in urban centres of 25,000 and over. It looks as though there is some factor among large urban centres in general which is contributing to these high death rates from cancer.

We have also examined the data on cancer mortality by specific sites. It was found that the reliability of the information was questionable for certain sites due to changes in the classification of the ICDA. We have selectively examined the data for sites which are not affected by the classification changes and analyzed the pooled mortality data for the regions within the groups and performed analysis of variance in accordance with the model in Appendix A, separately for each group by age and Census periods. The results for all neoplasms ICDA 140-239, all malignant neoplasms ICDA 140-209 all forms of leukemia ICDA 204-207, malignant neoplasms of the respiratory system ICDA 160-163, malignant neoplasms of small and large intestines, rectum and rectosigmoid function ICD 152-154 and malignant neoplasms of the stomach ICDA 151 are summarized in Table 9. In all cases, there was a very significant age effect as may well be expected. The variation between the Census periods did not attain statistical significance in any of the analyses. Females in Groups II and III showed a significantly declining trend in conformity with the Canadian experience as seen from(11) page 78. The increasing trend in lung cancer for males in Group II and the declining trend for stomach cancer for males, for Groups I, II and III further substantiate the national patterns(11), pages 79, 151. None of these results are suggestive of any association of cancer risk for all neoplasms or at specific sites with water fluoridation.

In concluding that our investigation did not reveal an association between cancer and fluoridation, it is necessary to note two factors which may be important but which we were unable to take into account on the basis of data available to us.

Firstly, we could not take mobility between regions into account. If the fluoride ion were a carcinogen, a person who had lived for a long period in a municipality supplied with fluoridated water might develop cancer subsequently in the non-fluoridated community to which he moved; conversely, someone moving into a locality with fluoridated water might develop cancer shortly after arrival which would undoubtedly be attributable to factors other than fluorides.

Secondly, we recognize that the period during which this study was conducted falls short of the latent period for cancer development associated with some carcinogens in man. Armenian and Lilienfield(15) report that latent periods have varied from a low of three years for radiation to a high of 37 years for exposure to asbestos particles. Most municipalities in Canada have received fluoridated water for twenty years or less. Nevertheless, the same is true in communities studied by Yiamouyiannis, Burk and Cecilioni. If their conclusions are valid, this would suggest a latent period sufficiently short for us to have detected differences between cancer mortality in municipalities supplied with fluoridated water compared to those supplied with non-fluoridated water. As we noted above, we were unable to demonstrate any such correlation.

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TABLE 1: Showing the Composition of the Groups

		Number of the Regions*													
Fluoridated**:															
Group I	5	18	21	22	23	42	52	62	77	79	80	84	88	97	
Group II	37	59	67	68	69	82									
Group III	3	6	34	44	48	50	51	53	71	86					
Group IV	1	11	14	27	60	70	76								
Non-Fluoridated:		2	7	9	10	13	15	16	17	19	20	25	26	28	30
	31	32	33	36	38	39	40	41	43	46	47	49	54	55	
	58	61	64	65	66	74	75	83	85	87	89	90	99	100	
Not Used:		4	8	12	24	29	35	45	56	57	63	72	73	78	81
	91	92	93	94	95	96	98								

* For description of the region, see Appendix, Table B1.

** For definition of groups, see Section 3.

TABLE 2: Percentage Age Distribution of Males in the Groups in 1971

Category	Population	Age Group									
		0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
<u>Fluoridated*:</u>											
Group I	782,340	19.5	20.3	17.0	12.7	12.0	8.9	5.5	2.8	1.2	0.1
Group II	1,207,060	17.8	17.6	18.0	14.0	13.4	9.0	6.0	2.8	0.9	0.1
Group III	643,250	19.1	19.7	17.6	12.4	12.2	9.1	5.7	3.1	1.1	0.1
Group IV	232,990	19.7	21.5	16.2	11.9	11.9	8.9	5.9	3.1	0.8	0.1
Non-Fluoridated	3,258,590	18.2	19.9	17.7	12.7	12.0	9.3	6.1	2.9	1.1	0.1
Total in Study	6,124,230	18.4	19.5	17.6	12.9	12.3	9.2	6.0	2.9	1.1	0.1
CANADA	10,795,400	19.3	20.9	16.1	12.1	11.6	9.2	6.3	3.2	1.2	0.1

* For definition of groups, see Section 3.

TABLE 3: Percentage Age Distribution of Females in the Groups in 1971

Category	Population	Age Group									
		0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
<u>Fluoridated*:</u>											
Group I	799,145	18.0	19.7	17.0	12.2	11.9	9.3	6.2	3.8	1.6	0.2
Group II	1,240,335	16.6	16.8	18.1	13.2	12.8	9.5	6.9	4.2	1.7	0.2
Group III	658,525	17.6	19.1	17.6	11.7	12.1	9.2	6.6	4.1	1.8	0.2
Group IV	235,905	18.7	20.6	15.9	11.4	12.1	9.0	6.4	4.2	1.4	0.2
Non-Fluoridated	3,363,060	16.9	18.9	17.5	12.1	12.0	9.9	6.9	4.1	1.7	0.2
Total in Study	6,296,970	17.1	18.7	17.5	12.2	12.2	9.6	6.8	4.1	1.7	0.2
CANADA	10,772,900	18.5	20.1	16.1	11.7	11.6	9.4	6.7	4.1	1.7	0.2

* For definition of groups, see Section 3.

TABLE 4: Summary of Analyses of Variance by Regions for the Four Groups for Males and Females for All Neoplasms(A) and All Malignant Neoplasms(B)

Category	Source of Variation	Sex	Statistical Significance		Remarks
			A	B	
Group I*	Census Periods	M	N.S.	N.S.	Decreasing Trend
		F	N.S.	N.S.	
	Trend	M	N.S.	N.S.	
		F	N.S.	P<.05	
Group II	Regions	M	P<.05	P<.05	
		F	N.S.	P<.05	
	Census Periods	M	N.S.	N.S.	
		F	N.S.	N.S.	
Group III	Trend	M	N.S.	N.S.	Increasing Trend
		F	N.S.	N.S.	
	Regions	M	N.S.	N.S.	
		F	N.S.	N.S.	
Group IV	Census Periods	M	N.S.	N.S.	
		F	N.S.	N.S.	
	Trend	M	N.S.	N.S.	
		F	N.S.	N.S.	
	Regions	M	N.S.	N.S.	
		F	N.S.	N.S.	

N.S.: Not statistically significant

* Significant non-additivity (P<.001) was present.

**TABLE 5: Summary of Wilcoxon Matched Pair Signed Rank Test
for Males and Females for All Neoplasms(A) and
All Malignant Neoplasms(B)**

Category	Sex	No. of Pairs	Years Compared	Statistical Significance		Remark
				A	B	
Group II	M	6	1956 vs 1971	N.S.	N.S.	1956 rates larger than 1971
	F	6	1956 vs 1971	P<.05	P<.05	
Group III	M	10	1961 vs 1971	P<.01	P<.01	1971 rates larger than 1961
	F	10	1961 vs 1971	N.S.	N.S.	
Group IV	M	7	1966 vs 1971	N.S.	N.S.	1971 rates larger than 1966
	F	7	1966 vs 1971	P<.02	P<.05	

TABLE 6: Quinquennial Age-Specific Mortality Rates Per 100,000 for Males for All Neoplasms

Centered Year	Category	Age Group									All Ages Crude Rates	Age-Adjusted Rate	S.M.R.
		0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+		
1956	Group I	13.9	3.7	13.7	20.2	75.1	280.7	745.7	1325.8	2146.4	2257.0	170.3	161.1
	Group II	17.0	9.1	11.7	31.8	97.9	370.1	850.9	1608.5	2461.0	2670.3	209.0	193.4
	Group III	11.8	6.8	11.7	25.8	75.1	302.0	744.5	1232.7	2155.8	2276.4	157.4	159.5
	Group IV	11.0	7.9	13.9	24.5	80.8	294.9	754.6	1195.8	2146.0	888.9	138.5	157.4
	Non Flu. Canada	13.0	9.4	15.5	29.3	91.3	330.4	806.9	1385.4	2330.1	2295.1	176.5	177.0
		11.0	8.0	12.6	25.3	73.5	257.4	620.5	1144.3	1871.6	1912.9	140.2	141.0
1961	Group I	9.5	8.0	11.5	22.4	71.1	246.1	693.5	1260.1	2073.3	1673.0	142.7	149.2
	Group II	10.6	8.5	13.3	26.3	80.6	304.0	759.8	1464.8	2104.5	2799.3	162.4	169.3
	Group III	10.2	11.5	9.7	24.1	75.5	288.5	731.4	1299.6	2025.4	2113.4	151.9	158.1
	Group IV	6.4	4.4	12.4	28.4	85.1	386.6	695.9	1423.0	2095.5	2407.4	147.4	160.7
	Non Flu. Canada	10.6	7.5	13.5	23.3	81.6	291.9	737.8	1362.7	2056.7	2095.2	153.8	161.7
		10.2	8.1	12.8	24.2	75.6	255.7	636.1	1220.2	1933.7	1989.9	142.4	145.1
1966	Group I	10.2	7.7	16.2	20.6	78.6	279.3	743.5	1470.0	2040.3	2744.5	152.2	164.6
	Group II	9.4	8.9	10.6	24.8	82.2	290.6	837.5	1556.6	2367.8	2783.1	162.1	178.0
	Group III	11.8	9.1	13.5	23.8	83.1	275.7	784.4	1410.4	1983.2	2145.6	154.4	164.6
	Group IV	7.9	8.8	9.5	26.2	84.9	286.7	708.3	1272.2	1981.7	1891.9	143.6	155.1
	Non Flu. Canada	9.2	8.7	13.2	26.7	87.7	307.7	792.9	1473.8	2170.8	2498.0	163.5	173.0
		9.7	8.1	12.9	24.3	80.3	264.7	691.5	1284.0	2000.2	2029.7	150.0	152.8
1971	Group I	10.0	6.0	12.0	21.5	85.2	288.6	794.6	1512.2	2134.5	2361.9	158.3	170.5
	Group II	9.9	7.7	8.3	26.0	87.8	280.8	800.8	1641.9	2532.6	2652.2	167.4	181.2
	Group III	10.1	8.8	10.2	23.8	83.8	291.9	780.5	1426.9	2091.7	2222.2	158.5	166.9
	Group IV	13.1	6.8	15.9	23.1	101.0	303.3	777.7	1415.3	2497.5	2243.9	162.1	175.2
	Non Flu. Canada	9.9	7.7	10.4	24.2	93.8	312.0	799.1	1573.5	2375.9	2688.6	171.8	179.5
		9.4	7.5	10.8	23.9	87.0	284.7	720.7	1401.2	2203.5	2055.7	162.9	162.9

** Significantly different from unity at the 99% level.

TABLE 7: Quinquennial Age-Specific Mortality Rates Per 100,000 for Females for All Neoplasms

Centered Year	Category	Age Group									All Ages Crude Rates	Age-Adjusted Rate	S.M.R.
		0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+		
1956	Group I	8.6	7.5	12.3	38.3	127.7	286.6	518.4	843.9	1330.9	1737.3	146.0	1.06
	Group II	11.1	8.9	11.1	45.2	152.0	310.1	549.2	1001.1	1659.9	2146.2	167.1	1.20**
	Group III	9.5	7.4	11.8	38.8	115.3	275.4	509.1	821.2	1247.1	1378.0	134.9	1.03
	Group IV	9.0	5.1	7.9	47.5	125.7	274.2	450.3	921.4	1167.6	2073.2	141.2	1.03
	Non Flu. Canada	11.2 8.7	7.0 6.3	13.0 11.0	46.8 38.7	144.5 122.2	309.6 257.8	592.2 479.0	961.2 815.3	1551.4 1358.0	1856.1 1329.3	165.2 138.0	1.20** 1.00
1961	Group I	9.1	5.0	10.0	30.8	118.7	256.2	453.4	749.2	1168.1	1386.1	128.8	0.96
	Group II	8.4	5.7	8.6	38.3	120.3	273.3	458.3	801.2	1341.6	1695.5	137.2	1.02
	Group III	8.3	8.3	11.6	39.2	119.8	269.9	428.9	819.2	1225.7	1481.5	134.3	0.98
	Group IV	10.5	6.3	7.9	44.3	124.4	258.9	442.0	731.4	1118.4	1004.2	128.3	0.97
	Non Flu. Canada	8.9 8.7	6.1 5.8	10.2 10.9	36.3 37.2	124.6 165.6	276.2 256.1	495.9 459.1	845.2 796.0	1385.6 1324.0	1476.7 1342.1	142.7 134.3	1.06** 1.00
1966	Group I	7.4	4.6	9.3	29.2	109.6	266.7	456.1	800.1	1310.4	1406.9	132.7	1.01
	Group II	7.6	4.5	10.0	30.1	110.0	259.0	494.8	804.6	1370.7	1577.3	136.4	1.04
	Group III	8.6	8.3	7.2	34.2	111.6	263.3	441.1	793.4	1111.2	1508.3	129.5	1.00
	Group IV	8.7	3.3	7.0	30.2	102.4	230.4	380.4	712.3	1269.6	1602.8	119.3	0.90
	Non Flu. Canada	8.2 8.1	6.0 5.7	9.8 9.8	37.4 34.0	121.2 112.6	280.3 253.9	499.4 455.8	830.1 772.5	1387.7 1299.1	1694.0 1315.5	142.8 131.3	1.09** 1.00
1971	Group I	6.9	6.0	7.4	27.2	116.6	272.6	486.5	845.3	1234.1	1551.0	136.9	1.22**
	Group II	8.3	6.5	7.6	28.7	110.3	267.7	460.2	782.8	1297.5	1611.7	132.9	1.18**
	Group III	7.6	4.8	7.6	35.5	97.4	253.6	430.3	761.6	1062.7	1264.5	122.9	1.13**
	Group IV	4.1	4.5	9.6	32.6	97.4	245.8	487.7	744.5	1315.6	1217.4	128.6	1.13*
	Non Flu. Canada	6.9 7.0	5.3 5.1	8.2 8.6	32.7 32.3	112.5 109.5	271.2 257.6	471.6 450.0	838.1 781.1	1336.9 1269.6	1607.1 1311.1	137.2 130.0	1.22** 1.00

* Significantly different from unity at the 95% level.

** Significantly different from unity at the 99% level.

TABLE 8: LSD, The Least Significant Difference Between The Mean Cancer Rates for All Neoplasms That Could Be Detected with 95% Confidence (the difference has been expressed as a percentage of the respective 1971 male and female cancer rates)

Category	LSD%	
	Males	Females
Group 1	40.7	37.5
Group II	19.2	29.6
Group III	10.9	7.6
Group IV	20.1	18.0

TABLE 9: Summary of ANOVA by Age Groups for the Four Groups for Males and Females for ICDA 140-239(A), ICDA 140-209(B), ICDA 204-207(C), ICDA 160-163(D), ICDA 152-154(E) and ICDA 151(F)

Category	Source of Variation	Sex	Statistical Significance					
			A	B	C	D	E	F
Group I	Census Periods	M	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
		F	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
	Trend	M	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
		F	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Group II	Census Periods	M	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
		F	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
	Trend	M	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
		F	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Group III	Census Periods	M	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
		F	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
	Trend	M	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
		F	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Group IV	Census Periods	M	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
		F	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
	Trend	M	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
		F	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

- Signifies decreasing trend
+ Signifies increasing trend
N.S.: Not-Statistically Significant

The two-way analysis of variance model used in this paper may be written as:

$$y_{ij} = \mu + \alpha_i + \beta_j + \epsilon_{ij}, \quad \begin{matrix} i = 1, \dots, p \\ j = 1, \dots, 4 \end{matrix}$$

where μ is the general mean effect, α is the row effect, β is the column effect and ϵ_{ij} are random errors assumed to be distributed identically and independently as $N(0, \sigma^2)$, and $Y_{ij} = \arcsin \sqrt{x_{ij}}$ where x_{ij} are the age-adjusted or age-specific cancer mortality rates as the case may be. Since these rates are each based on a large sample size (at least 10,000), the sampling errors have been neglected. The column effects were identified with the four Census periods viz., 1956, 1961, 1966 and 1971. Since these periods are equally spaced, one degree of freedom for linear regression over the period was partitioned out and tested for statistical significance.

The analyses were performed separately by sex for the four groups comprising the fluoridated regions according to the chronological merging scheme shown in Table 1.

For the first set of analyses the row effects were identified with the regions comprising the group and for the second, there were identified with the ten age groups for which the age-specific rates were obtained by pooling the regions for that group.

Though the data in these analyses could not be legitimately considered as arising from a randomized block design, to test approximately the validity of the additive model and to indicate the possible presence of row-column interaction, one degree of freedom for non-additivity was partitioned off according to Tukey's method.

A sample of the analysis of variance calculation is shown below.

ANOVA Table for All Malignant Neoplasms for
Group IV for Females

Source of Variation	D.F.	Sum of Squares	Mean Squares	F ratio
Between Regions	6	1.01E-6	0.17E-6	1.28
Between Periods	3	0.53E-6	0.18E-6	1.34
Linear Regression	1	0.03E-6	0.03E-6	0.25
Non Additivity	1	0.14E-6	0.14E-6	1.11
Remainder	17	2.22E-6	0.13E-6	
Error	18	2.36E-6	0.13E-6	
TOTAL	27	2.84E-6		

In the analysis of variance, the null hypothesis of interest is the equality of the column effect viz:

$$\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$$

Even if the null hypothesis is accepted, the sub-hypothesis of linear trend in the rates is of further interest. If fluoridation results in an elevation of cancer mortality and if the effect is cumulative then the maximum effect should manifest in the latest mortality rates namely the rates for 1971 Census period. To minimize the influence of regression and other possible environmental variables, the rates for 1971 were compared with the closest nonfluoridated Census rates for each region by sex for the four fluoridated groups.

The mathematical model may be written as:

$$x_{ij} = \mu + \alpha_i + \Delta.k + \epsilon_{ij} \quad i = 1, \dots, p \\ j = 1, \dots, 4$$

where x_{ij} are the age-adjusted rates for the i^{th} region over the j^{th} period, α_i are the effects of i^{th} region, Δ is the quinquennial rate of elevation of cancer mortality and ϵ_{ij} are independent, identically distributed random variables, further,

$k = \max(o, j-t)$ where t is the number of the group.

The appropriate statistical test for the null hypothesis $\Delta = 0$ vs $\Delta \neq 0$ is the Wilcoxon Matched pairs Signed-ranks test.

A sample of the calculation is shown below.

Wilcoxon Matched Pair Signed Rank Test for
All Neoplasms for Groups II for Males

Region	Non-Fluoridated rate for 1956	Fluoridated rate for 1971	Difference	Signed Rank
37	166.24	235.63	-69.39	-5
59	144.13	191.76	-47.63	-4
67	179.97	191.67	-11.70	-2
68	244.93	174.44	70.49	6
69	125.52	172.37	-46.85	-3
82	151.21	148.30	2.91	1

Positive rank sum = 7

Negative rank sum = 14

Minimum rank sum = 7

Significance: $P > 0.05$

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FIGURE B1

SELECTED REGIONS FOR FLUORIDATION AND CANCER STUDY

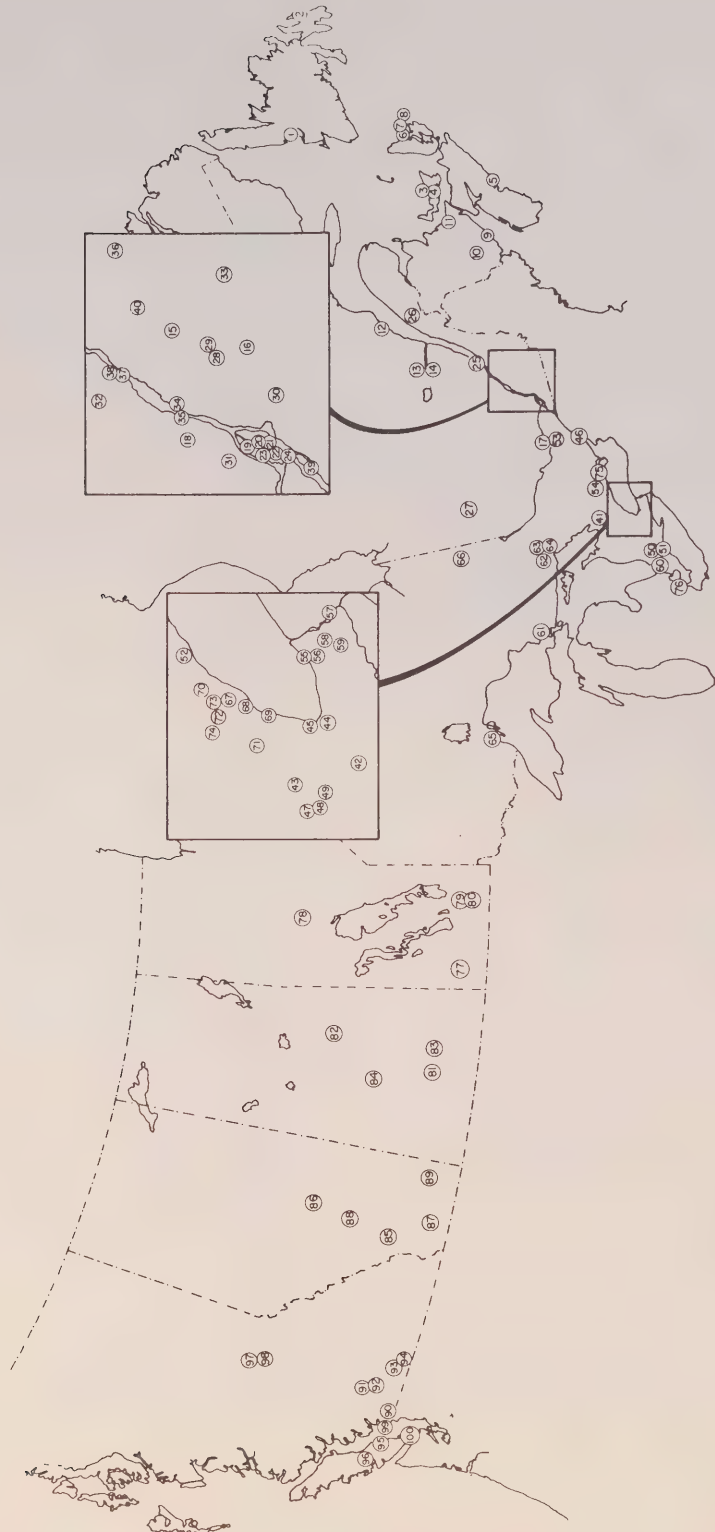


TABLE B1

Metropolitan Areas and Component Municipalities

Included in Fluoridation-Cancer Study

<u>Code No.</u>	<u>Metropolitan Area</u>	<u>Component Municipalities (1971)</u>	<u>Month and Year of Fluoridation</u>
<u>NEWFOUNDLAND</u>			
1	Corner Brook	Corner Brook c.	Dec. 1970
2	St. John's	St. John's c. Mount Pearl c.	NF
<u>PRINCE EDWARD ISLAND</u>			
3	Charlottetown Group 1	Charlottetown c.	April 1968
4	Charlottetown Group 2	Parkdale vl. Sherwood vl.	NF
<u>NOVA SCOTIA</u>			
5	Halifax	Halifax c. Dartmouth c.	June 1956 July 1956
6	Sydney Group 1	Sydney c.	June 1968
7	Sydney Group 2	Glace Bay t. New Waterford t.	NF
8	Sydney Mines	Sydney Mines t. North Sydney t.	NF
<u>NEW BRUNSWICK</u>			
9	Saint John	Saint John c.	NF
10	Fredericton	Fredericton c. Bakers Point vl. Marysville t. Nashwaaksis vl.	NF

Note: c=city; t=town; vl.=village; mun.=municipality; twp.=township; R.D.=Rural District; b=Borough; D.M.=District Municipality; NF=Non-Fluoridated.

<u>Code No.</u>	<u>Metropolitan Area</u>	<u>Component Municipalities (1971)</u>	<u>Month and Year of Fluoridation</u>
<u>NEW BRUNSWICK</u> (cont)			
11	Moncton	Moncton c. Bridgedale vl. Dieppe t. Gunningsville vl. Lewisville vl. Riverview vl. Heights vl.	April 1970
<u>QUEBEC</u>			
12	Baie-Comeau	Baie-Comeau t. Hauterive t.	NF
13	Chicoutimi-Jonquière Group 1	Chicoutimi c. Arvida c. Chicoutimi-Nord c. Jonquière c. Rivière du Moulin t. Port Alfred t.	NF
14	Chicoutimi-Jonquière Group 2	Kénogami c.	May 1969
15	Drummondville	Drummondville c. Drummondville Sud t. Wendover & Simpson mun.	NF
16	Granby	Granby c.	NF
17	Hull	Hull c. Aylmer t. Deschênes vl. Gatineau t. Lucerne mun. Pointe-Gatineau t. Templeton vl. Touraine mun.	NF
18	Joliette	Joliette c. Notre-Dame-des-Prairies mun. St.-Charles-Borromée mun.	June 1957
19	Montreal Group 1	Montreal c.	NF

<u>Code No.</u>	<u>Metropolitan Area</u>	<u>Component Municipalities (1971)</u>	<u>Month and Year of Fluoridation</u>
<u>QUEBEC</u> (cont.)			
20	Montreal Group 2	Anjou t. Boucherville t. Brossard t. Candiac t. Charlemagne t. Côte-St-Luc t. Delson t. Deux-Montagnes c. Dorion t. Greenfield Park t. Hampstead t. Lachine c. Laflèche c. LaPrairie c. LaSalle c. LeMoyne t. Longueuil c. Montreal East t. Montreal North c. Montreal West t. Mount Royal t. Notre-Dame mun. Outremont c. Pointe-aux- Trembles c. Pointe-Calumet vl. Repentigny t. St. Basile-le Grand t. St. Bruno de Montarville t. Ste-Catherine- d'Alexandrie - de Laprairie mun. St. Constant mun. St. Eustache mun. St. Hubert t. St. Jean-de-Dieu mun. St. Lambert c. St. Laurent c. St. Léonard c. Ste. Marthe-sur- le Lac mun. St. Paul-l'Ermite mun. St. Pierre t. Ste. Thérèse c. Ste. Thérèse West t. Verdun c. Westmount c.	NF

<u>Code No.</u>	<u>Metropolitan Area</u>	<u>Component Municipalities (1971)</u>	<u>Month and Year of Fluoridation</u>
<u>QUEBEC</u> (cont.)			
21	Montreal Group 3	Baie-d'Urfé t. Beaconsfield c. Dollard-des-Ormeaux t. Kirkland t. Pointe-Claire c. Ste.-Anne-de-Bellevue t.	February 1955
22	Montreal Group 4	Dorval c. Île Dorval t.	April 1957
23	Montreal Group 5	Laval c.	June 1958
24	Montreal Group 6	Bois-des-Filions vl. Île Perrot t. Lorraine t. Pierrefonds c. Pincourt t. Rosemère t. Roxboro t. Ste. Geneviève t. Terrasse-Vaudreuil mun.	December 1963 to Feb. 1964
25	Quebec City	Quebec c. Ancienne Lorette t. Beauport c. Charlesbourg c. Courville t. Giffard c. Lauzon c. Lévis c. Montmorency t. Orsainville t. St. David de l'Auberivière t. St. Félix-du-Cap-Rouge mun. Ste. Foy c. St. Michel-Archange mun. St. Romuald-d'Etchemin c. Sillery c. Vanier t. Villeneuve t.	NF

<u>Code No.</u>	<u>Metropolitan Area</u>	<u>Component Municipalities (1971)</u>		<u>Month and Year of Fluoridation</u>
<u>QUEBEC (cont.)</u>				
26	Rimouski	Rimouski Rimouski-Est	c. vl.	NF
27	Rouyn	Rouyn Noranda	c. c.	May 1971
28	St. Hyacinthe Group 1	St. Hyacinthe Douville LaProvidence	c. t. t.	NF
29	St. Hyacinthe Group 2	St. Joseph Ste. Rosalie	t. vl.	April 1961
30	St. Jean	St. Jean Iberville St. Luc	c. t. t.	NF
31	St. Jérôme	St. Jérôme Lafontaine St. Antoine	c. vl. t.	NF
32	Shawinigan	Shawinigan Baie-de- Shawinigan Grand Mère Shawinigan-Sud	c. vl. c. t.	NF
33	Sherbrooke	Sherbrooke Lennoxville	c. t.	NF
34	Sorel Group 1	Sorel	c.	November 1965
35	Sorel Group 2	St. Joseph de Sorel Tracy	t. t.	NF
36	Thetford Mines	Thetford Mines Black Lake	c. t.	NF
37	Trois-Rivières Group 1	Trois-Rivières	c.	September 1962

<u>Code No.</u>	<u>Metropolitan Area</u>	<u>Component Municipalities (1971)</u>	<u>Month and Year of Fluoridation</u>
<u>QUEBEC (Cont.)</u>			
38	Trois-Rivières Group 2	Cap-de-la Madeleine Ste. Marthe-du- Cap-de-la Madeleine Trois-Rivières- Ouest	c. NF mun. t.
39	Valleyfield	Valleyfield Grande-Île St. Timothée St. Timothée	c. mun. vl. mun.
40	Victoriaville	Victoriaville Arthabaska	t. t. NF
<u>ONTARIO</u>			
41	Barrie	Barrie	c. NF
42	Brantford	Brantford Paris	c. t. June 1945
43	Guelph	Guelph	c. NF
44	Hamilton Group 1	Hamilton Dundas Saltfleet Stoney Creek	c. t. twp. t. October 1967
45	Hamilton Group 2	Burlington	t. October 1961
46	Kingston	Kingston Kingston Pittsburgh	c. twp. twp. NF
47	Kitchener Group 1	Kitchener Bridgeport	c. vl. NF
48	Kitchener Group 2	Waterloo	c. June 1967

<u>Code No.</u>	<u>Metropolitan Area</u>	<u>Component Municipalities (1971)</u>		<u>Month and Year of Fluoridation</u>
<u>ONTARIO</u> (cont.)				
49	Kitchener Group 3	Ayr Galt Hespeler Preston	vl. c. t. t.	NF
50	London Group 1	London	c.	September 1967
51	London Group 2	St. Thomas	c.	May 1965
52	Oshawa	Oshawa Whitby	c.	February 1953 December 1962
53	Ottawa	Ottawa Gloucester Nepean Rockcliffe Park Vanier	c. twp. twp. vl. c.	November 1965
54	Peterborough	Peterborough Douro	c. twp.	NF
55	St. Catharines Group 1	St. Catharines	c.	NF
56	St. Catharines Group 2	Thorold	t.	February 1952
57	St. Catharines Group 3	Fort Erie	t.	January 1952
58	St. Catharines Group 4	Niagara Falls Niagara-on-the- Lake Pelham Port Colborne	c. t. t. c.	NF
59	St. Catharines Group 5	Welland	c.	August 1963
60	Sarnia	Sarnia Moore Point Edward	c. twp. vl.	July 1971
61	Sault Ste. Marie	Sault Ste. Marie	c.	NF
62	Sudbury Group 1	Sudbury	c.	August 1952

<u>Code No.</u>	<u>Metropolitan Area</u>	<u>Component Municipalities (1971)</u>	<u>Month and Year of Fluoridation</u>
<u>ONTARIO</u> (cont.)			
63	Sudbury Group 2	Copper Cliff t.	NF
64	Sudbury Group 3	Balfour twp. Capreol t. Coniston t. Falconbridge twp. Lively t. Neelon & Garson twp. Rayside twp. Valley twp. Waters twp.	NF
65	Thunder Bay	Thunder Bay c.	NF
66	Timmins	Timmins c.	NF
67	Toronto Group 1	Toronto c.	September 1963
68	Toronto Group 2	Etobicoke b. Oakville t. Scarborough b. York b. York East b. York North b.	September 1963 April 1963 September 1963
69	Toronto Group 3	Mississauga t. Port Credit t. Streetsville t.	June 1961 October 1961 April 1962
70	Toronto Group 4	Ajax t. Pickering vl. Pickering twp.	March 1971 June 1971
71	Toronto Group 5	Brampton t.	June 1968
72	Toronto Group 6	Chinguacousy twp.	August 1970
73	Toronto Group 7	Richmond Hill t. Markham	NF

<u>Code No.</u>	<u>Metropolitan Area</u>	<u>Component Municipalities (1971)</u>	<u>Month and Year of Fluoridation</u>
<u>ONTARIO (cont.)</u>			
74	Toronto Group 8	Acton t. Aurora t. Bolton vl. Esqueewing twp. Georgetown t. King twp. Milton t. Newmarket t. Vaughan t. Whitechurch-Stouffville t.	NF
75	Trenton	Trenton t. Frankford vl. Sidney twp.	NF
76	Windsor	Windsor c. St. Clair Beach vl. Sandwich West twp. Tecumseh t.	June 1969
<u>MANITOBA</u>			
77	Brandon	Brandon c.	March 1955
78	Thompson	Thompson c.	NF
79	Winnipeg Group 1	Winnipeg c.	December 1956
80	Winnipeg Group 2	Charleswood mun. East Kildonan c. Fort Garry mun. Kildonan North mun. Old Kildonan mun. St. Boniface c. St. James-Assiniboia c. St. Vital c. Transcona c. Tuxedo t. West Kildonan c.	December 1956

<u>Code No.</u>	<u>Metropolitan Area</u>	<u>Component Municipalities (1971)</u>		<u>Month and Year of Fluoridation</u>
<u>SASKATCHEWAN</u>				
81	Moose Jaw	Moose Jaw	c.	1952
82	Prince Albert	Prince Albert	c.	1960
83	Regina	Regina	c.	NF
84	Saskatoon	Saskatoon	c.	1955
<u>ALBERTA</u>				
85	Calgary	Calgary	c.	NF
86	Edmonton	Edmonton	c.	1967
87	Lethbridge	Lethbridge	c.	NF
88	Red Deer	Red Deer	c.	1958
89	Medicine Hat	Medicine Hat Redcliff	c. t.	NF
<u>BRITISH COLUMBIA</u>				
90	Chilliwack	Chilliwack Chilliwack	c. D.M.	NF
91	Kamloops Group 1	Kamloops	c.	1963
92	Kamloops Group 2	Dufferin Valleyview	D.M. t.	NF
		Subdivision B Thompson Nicola	R.D.	NF
93	Kelowna Group 1	Kelowna	c.	1956
94	Kelowna Group 2	Subdivision A Central Okanagan	R.D.	NF
		Subdivision B Central Okanagan	R.D.	

<u>Code No.</u>	<u>Metropolitan Area</u>	<u>Component Municipalities (1971)</u>		<u>Month and Year of Fluoridation</u>
<u>BRITISH COLUMBIA (cont.)</u>				
95	Nanaimo	Nanaimo	c.	NF
		Subdivision A Nanaimo	R.D.	
96	Port Alberni	Port Alberni	c.	NF
		Subdivision A Alberni- Clayoquot	R.D.	
97	Prince George Group 1	Prince George	c.	1955
98	Prince George Group 2	South Fort George	vl.	NF
		Subdivision A Fraser-Fort George	R.D.	
99	Vancouver	Vancouver	c.	NF
		Burnaby	mun.	
		Coquitlam	mun.	
		Delta	mun.	
		Fraser Mills	mun.	
		New Westminster	c.	
		Port Moody	c.	
		Richmond	mun.	
		Surrey	mun.	
		University Endowment Area		
		West Vancouver	mun.	
100	Victoria	Victoria	c.	NF
		Esquimalt	mun.	
		Oak Bay	mun.	
		Saanich	mun.	
		Subdivision B Capital	R.D.	

TABLE B2

Census Population By Sample Region And Sex

<u>REGION</u>	<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
<u>CANADA</u>				
M	8151900	9218900	10054400	10795400
F	7928900	9019400	9960500	10772900
T	16080800	18238300	20014900	21568300
<u>NEWFOUNDLAND</u>				
1. <u>Corner Brook</u>				
M	11203	12555	13593	13375
F	12022	12650	13523	13200
T	23225	25205	27116	26575
2. <u>St. John's</u>				
M	27309	32025	40912	46540
F	29769	34393	43400	48840
T	57078	66418	84312	95380
<u>PRINCE EDWARD ISLAND</u>				
3. <u>Charlottetown</u> (Group 1)				
M	7664	8496	8527	8755
F	9043	9825	9900	10395
T	16707	18321	18427	19150
4. <u>Charlottetown</u> (Group 2)				
M	N/A	1656	2202	2930
F	N/A	1662	2276	3110
T	N/A	3318	4478	6040
<u>NOVA SCOTIA</u>				
5. <u>Halifax</u>				
M	57226	69777	71910	91910
F	57168	69705	73627	95075
T	114394	139482	145537	186985
6. <u>Sydney</u> (Group 1)				
M	15890	16633	15941	16200
F	16272	16986	16826	16970
T	32162	33619	32767	33170

<u>REGION</u>	<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
7. <u>Sydney (Group 2)</u>				
M	12146	17454	16663	16145
F	12270	17324	16578	15725
T	24416	34778	33241	31870
8. <u>Sydney Mines</u>				
M	N/A	8753	8841	8910
F	N/A	9026	9082	8820
T	N/A	17779	17923	17730

NEW BRUNSWICK

9. <u>Saint John</u>				
M	31157	34132	32370	43810
F	33705	36161	35033	45345
T	64862	70293	67403	89155
10. <u>Fredericton</u>				
M	8829	10967	12505	18710
F	9474	11950	13527	19440
T	18303	22917	26032	38150
11. <u>Moncton</u>				
M	16837	22757	23384	31740
F	19166	25116	26310	34050
T	36003	47873	49694	65790

QUEBEC

12. <u>Baie Comeau</u>				
M	N/A	7197	12287	12945
F	N/A	6739	11315	12550
T	N/A	13936	23602	25495
13. <u>Chicoutimi-Jonquière (Group 1)</u>				
M	31663	50244	53471	54230
F	31684	49783	53688	54160
T	63347	100027	107159	108390
14. <u>Chicoutimi-Jonquière (Group 2)</u>				
M	5761	6024	5813	5460
F	5548	5792	5721	5505
T	11309	11816	11534	10965

<u>REGION</u>		<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
15.	<u>Drummondville</u>				
	M	12762	20917	21084	22560
	F	13522	21571	21727	23115
	T	26284	42488	42811	45675
16.	<u>Granby</u>				
	M	13312	15562	16879	16915
	F	13783	15909	17470	17485
	T	27095	31471	34349	34400
17.	<u>Hull</u>				
	M	24445	46345	57120	66880
	F	24798	45881	57482	66905
	T	49243	92226	114602	133785
18.	<u>Joliette</u>				
	M	8128	8709	11472	14265
	F	8812	9370	12293	15270
	T	16940	18079	23765	29535
19.	<u>Montreal</u> (Group 1)				
	M	542060	581051	597340	588035
	F	567379	609855	624915	627405
	T	1109439	1190906	1222255	1215440
20.	<u>Montreal</u> (Group 2)				
	M	173294	323325	409384	461625
	F	182411	332244	419204	479460
	T	355705	655569	828588	941085
21.	<u>Montreal</u> (Group 3)				
	M	7551	20952	30648	41875
	F	7657	21234	30128	41750
	T	15208	42186	60776	83625
22.	<u>Montreal</u> (Group 4)				
	M	7002	9248	10435	10125
	F	7053	9346	10477	10475
	T	14055	18594	20912	20600
23.	<u>Montreal</u> (Group 5)				
	M	5269	64390	99944	115315
	F	5979	61345	96144	113775
	T	11248	125735	196088	229090

<u>REGION</u>	<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
24. <u>Montreal</u> (Group 6)				
M	N/A	18656	27162	34845
F	N/A	18199	26923	34275
T	N/A	36855	54085	69120
25. <u>Quebec City</u>				
M	98553	155361	174818	203365
F	110664	168188	189874	220530
T	209217	323549	364692	423895
26. <u>Rimouski</u>				
M	6991	9141	10534	13850
F	7639	10179	11839	15195
T	14630	19320	22373	29045
27. <u>Rouyn</u>				
M	14145	15491	15198	14185
F	13254	14702	14904	14220
T	27399	30193	30102	28405
28. <u>St. Hyacinthe</u> (Group 1)				
M	9284	14778	14502	14935
F	11155	16538	16569	16980
T	20439	31316	31071	31915
29. <u>St. Hyacinthe</u> (Group 2)				
M	N/A	N/A	2862	3505
F	N/A	N/A	2809	3595
T	N/A	N/A	5671	7100
30. <u>St. Jean</u>				
M	12428	17100	19940	24035
F	11939	17476	19825	23090
T	24367	34576	39765	47125
31. <u>St. Jérôme</u>				
M	10132	14591	16542	17595
F	10513	14718	16716	17675
T	20645	29309	33258	35270
32. <u>Shawinigan</u>				
M	26386	31733	29907	28210
F	27181	32261	30529	28825
T	53567	63994	60436	57035

<u>REGION</u>	<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
33. <u>Sherbrooke</u>				
M	27450	34245	38446	40300
F	31218	36813	41221	44115
T	58668	71058	79667	84415
34. <u>Sorel</u> (Group 1)				
M	8211	8571	9492	9625
F	8265	8576	9529	9965
T	16476	17147	19021	19590
35. <u>Sorel</u> (Group 2)				
M	N/A	5938	7423	7610
F	N/A	5821	7220	7475
T	N/A	11759	14643	15085
36. <u>Thetford Mines</u>				
M	9689	12785	12746	12940
F	9822	13037	13054	13345
T	19511	25822	25800	26285
37. <u>Trois-Rivières</u> (Group 1)				
M	24716	26150	27978	27030
F	25767	27329	29562	28540
T	50483	53479	57540	55570
38. <u>Trois-Rivières</u> (Group 2)				
M	11253	14114	15619	20635
F	11690	14551	15964	21175
T	22943	28665	31583	41810
39. <u>Valleyfield</u>				
M	11500	17337	18446	18545
F	12084	17363	18509	18990
T	23584	34700	36955	37535
40. <u>Victoriaville</u>				
M	7758	11544	12199	12780
F	8273	12035	13028	13640
T	16031	23579	25227	26420

<u>REGION</u>	<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
<u>ONTARIO</u>				
41. <u>Barrie</u>				
M	8165	10429	11791	13580
F	8686	10740	12225	14130
T	16851	21169	24016	27710
42. <u>Brantford</u>				
M	25261	32947	32345	34965
F	26608	34248	33780	36070
T	51869	67195	66125	71035
43. <u>Guelph</u>				
M	16385	19326	25546	29770
F	17475	20514	25831	30240
T	33860	39840	51377	60010
44. <u>Hamilton</u> (Group 1)				
M	124324	153415	167934	175440
F	128368	155966	170915	178715
T	252692	309381	338849	354155
45. <u>Hamilton</u> (Group 2)				
M	N/A	23647	33125	43775
F	N/A	23379	32816	43260
T	N/A	47626	65941	87035
46. <u>Kingston</u>				
M	23820	37161	38448	42560
F	24798	35836	37915	43390
T	48618	72997	76363	85950
47. <u>Kitchener</u> (Group 1)				
M	29128	37665	47308	56535
F	30434	38495	48058	57965
T	59562	76160	95366	114500
48. <u>Kitchener</u> (Group 2)				
M	8119	10624	14923	18275
F	8254	10744	14966	18360
T	16373	21368	29889	36635

<u>REGION</u>	<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
49. <u>Kitchener</u> (Group 3)				
M	11459	22069	26397	31260
F	12280	22875	26991	32270
T	23739	44944	53388	63530
50. <u>London</u> (Group 1)				
M	48588	77003	94294	107830
F	53105	81329	100122	114590
T	101693	158332	194416	222420
51. <u>London</u> (Group 2)				
M	9038	10707	10885	12190
F	10091	11764	12098	13295
T	19129	22471	22983	25485
52. <u>Oshawa</u>				
M	25480	38488	47728	58015
F	24932	38613	47627	58745
T	50412	77101	95355	116760
53. <u>Ottawa</u>				
M	115079	164439	182274	209395
F	126333	173194	193196	219925
T	241412	337633	375470	429320
54. <u>Peterboro</u>				
M	20627	24469	28576	29670
F	22071	25861	30467	31650
T	42698	50330	59043	61320
55. <u>St. Catharines</u> (Group 1)				
M	19454	41923	48216	54020
F	20254	42551	48885	55620
T	39708	84474	97101	109640
56. <u>St. Catharines</u> (Group 2)				
M	N/A	4324	4443	7560
F	N/A	4309	4400	7295
T	N/A	8633	8843	14855
57. <u>St. Catharines</u> (Group 3)				
M	N/A	4464	4876	11285
F	N/A	4563	4917	11755
T	N/A	9027	9793	23040

<u>REGION</u>	<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
58. <u>St. Catharines</u> (Group 4)				
M	18816	23335	40164	55305
F	18775	23733	40616	56245
T	37591	47068	80780	111550
59. <u>St. Catharines</u> (Group 5)				
M	8239	18184	20019	22125
F	8166	17895	19941	22380
T	16405	36079	39960	44505
60. <u>Sarnia</u>				
M	21755	29718	31722	33745
F	21692	29732	31809	33715
T	43447	59450	63531	67460
61. <u>Sault Ste. Marie</u>				
M	19242	22015	37747	40775
F	18087	21137	36847	39480
T	37329	43152	74594	80255
62. <u>Sudbury</u> (Group 1)				
M	24302	41398	43378	47105
F	22180	38722	41510	43530
T	46482	80120	84888	90635
63. <u>Sudbury</u> (Group 2)				
M	N/A	1882	1779	2110
F	N/A	1718	1726	1985
T	N/A	3600	3505	4095
64. <u>Sudbury</u> (Group 3)				
M	6992	15035	15378	25825
F	6758	13912	14664	24280
T	13750	28947	30042	50105
65. <u>Thunder Bay</u>				
M	20155	23001	39286	54630
F	19309	22213	38225	53640
T	39464	45214	77511	108270
66. <u>Timmins</u>				
M	14136	15343	15008	14550
F	13415	14192	14277	13885
T	27551	29535	29285	28435

<u>REGION</u>		<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
67.	<u>Toronto</u> (Group 1)				
	M	327815	329817	324740	348810
	F	339891	342620	339844	364185
	T	667706	672437	664584	712995
68.	<u>Toronto</u> (Group 2)				
	M	176154	420301	574638	708180
	F	181151	425050	584482	725675
	T	357305	845351	1159120	1433855
69.	<u>Toronto</u> (Group 3)				
	M	24305	38130	54862	86915
	F	22748	36746	52989	85085
	T	47053	74876	107851	172000
70.	<u>Toronto</u> (Group 4)				
	M	7120	13648	19934	23755
	F	6677	13064	19320	23015
	T	13797	26712	39254	46770
71.	<u>Toronto</u> (Group 5)				
	M	6318	9413	18634	20765
	F	6269	9056	17630	20385
	T	12587	18469	36264	41150
72.	<u>Toronto</u> (Group 6)				
	M	N/A	3988	8331	15895
	F	N/A	3583	7950	15185
	T	N/A	7571	16281	31080
73.	<u>Toronto</u> (Group 7)				
	M	N/A	10443	13883	34630
	F	N/A	10297	13659	34390
	T	N/A	20740	27542	69020
74.	<u>Toronto</u> (Group 8)				
	M	12555	42757	46230	57690
	F	11420	41233	45197	56720
	T	23975	83990	91427	114410

<u>REGION</u>		<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
75.	<u>Trenton</u>				
	M	11508	13511	13912	14605
	F	11002	12713	13482	14185
	T	22510	26224	27394	28790
76.	<u>Windsor</u>				
	M	71155	73792	103139	110730
	F	70037	75126	104379	112200
	T	141192	148918	207518	222930

MANITOBA

77.	<u>Brandon</u>				
	M	12140	14690	14553	15155
	F	12656	15209	15428	16070
	T	24796	29899	29981	31225
78.	<u>Thompson</u>				
	M	N/A	2455	5026	10670
	F	N/A	994	3820	8375
	T	N/A	3449	8846	19045
79.	<u>Winnipeg</u> (Group 1)				
	M	124036	129440	123693	118385
	F	131057	135998	133312	127750
	T	255093	265438	257005	246135
80.	<u>Winnipeg</u> (Group 2)				
	M	50898	127132	122791	142915
	F	52021	126563	124380	145855
	T	102919	253695	247171	288770

SASKATCHEWAN

81.	<u>Moose Jaw</u>				
	M	14587	16423	16417	15460
	F	15016	16783	17000	16565
	T	29603	33206	33417	32025
82.	<u>Prince Albert</u>				
	M	9923	11968	12850	14000
	F	10443	12201	13419	14470
	T	20366	24169	26269	28470

<u>REGION</u>		<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
83.	<u>Regina</u>				
	M	43977	55473	64291	68165
	F	45778	56671	66836	71270
	T	89755	112144	131127	139435
84.	<u>Saskatoon</u>				
	M	35545	46825	56637	61540
	F	37313	48707	59255	64905
	T	72858	95532	115892	126445

ALBERTA

85.	<u>Calgary</u>				
	M	92712	142326	164151	201335
	F	89068	140342	166424	202615
	T	181780	282668	330575	403950
86.	<u>Edmonton</u>				
	M	121326	161114	188679	218865
	F	120633	159488	190751	219605
	T	241959	320602	379430	438470
87.	<u>Lethbridge</u>				
	M	14634	19100	18318	20515
	F	14828	19158	18868	20820
	T	29462	38258	37186	41335
88.	<u>Red Deer</u>				
	M	6131	9784	12956	13775
	F	6207	9828	13215	13870
	T	12338	19612	26171	27645
89.	<u>Medicine Hat</u>				
	M	10321	13365	13546	14090
	F	10505	13747	14169	14690
	T	20826	27112	27715	28780

BRITISH COLUMBIA

90.	<u>Chilliwack</u>				
	M	8196	13333	14254	16365
	F	8154	13225	14497	16110
	T	16350	26558	28751	32475

<u>REGION</u>	<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
91. <u>Kamloops</u> (Group 1)				
M	N/A	5176	N/A	13355
F	N/A	4901	N/A	12885
T	N/A	10077	N/A	26240
92. <u>Kamloops</u> (Group 2)				
M	N/A	N/A	N/A	10895
F	N/A	N/A	N/A	9955
T	N/A	N/A	N/A	20850
93. <u>Kelowna</u> (Group 1)				
M	N/A	6385	8140	9405
F	N/A	6805	8866	9930
T	N/A	13190	17006	19335
94. <u>Kelowna</u> (Group 2)				
M	N/A	N/A	N/A	14420
F	N/A	N/A	N/A	14015
T	N/A	N/A	N/A	28435
95. <u>Nanaimo</u>				
M	N/A	N/A	N/A	19905
F	N/A	N/A	N/A	19460
T	N/A	N/A	N/A	39365
96. <u>Port Alberni</u>				
M	N/A	6112	7098	15135
F	N/A	5448	6657	13975
T	N/A	11560	13755	29110
97. <u>Prince George</u> (Group 1)				
M	5572	7457	12819	16995
F	4991	6714	11652	16005
T	10563	14171	24471	33000
98. <u>Prince George</u> (Group 2)				
M	N/A	N/A	N/A	13425
F	N/A	N/A	N/A	11810
T	N/A	N/A	N/A	25235

<u>REGION</u>	<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>
99. <u>Vancouver</u>				
M	287691	351854	396186	448845
F	289707	354719	402056	456520
T	577398	706573	798242	905365
100. <u>Victoria</u>				
M	58361	65037	71016	86695
F	59822	67643	76296	93990
T	118183	132680	147312	180685

TABLE B3

Adjusted Death Rates Per 100,000 With 1971
Canadian Population as The Standard
All Malignant Neoplasms

Region Number	Region Name and Province	Sex	1956	1961	1966	1971
	Canada	M	139.3	143.6	151.3	161.6
		F	135.3	132.1	129.5	128.6
	<u>NEWFOUNDLAND</u>					
1	Corner Brook	M	163.9	169.4	143.9	162.6
		F	140.5	106.0	68.6	116.4
2	St. John's	M	206.2	199.4	181.3	183.7
		F	169.0	173.5	160.4	136.2
	<u>PRINCE EDWARD ISLAND</u>					
3	Charlottetown Group 1	M	153.9	151.4	155.9	170.6
		F	150.3	143.3	161.3	132.2
4	Charlottetown Group 2	M	N/A	122.7	148.0	418.0
		F	N/A	132.9	79.6	125.3
	<u>NOVA SCOTIA</u>					
5	Halifax	M	156.4	151.2	171.3	182.0
		F	150.9	141.4	142.0	152.8
6	Sydney Group 1	M	156.7	155.5	205.8	160.8
		F	149.0	151.2	133.0	163.4
7	Sydney Group 2	M	221.6	163.2	189.0	198.7
		F	199.3	150.7	151.0	152.9
8	Sydney Mines	M	N/A	191.5	144.0	211.3
		F	N/A	168.6	189.7	192.0
	<u>NEW BRUNSWICK</u>					
9	Saint John	M	144.1	142.2	187.0	187.6
		F	130.0	151.1	157.4	140.9
10	Fredericton	M	169.1	164.3	139.7	165.0
		F	143.9	147.1	132.1	131.8

Region Number	Region Name and Province	Sex	1956	1961	1966	1971
11	Moncton	M	123.4	147.4	130.7	141.9
		F	138.7	120.5	131.3	139.0
	<u>QUEBEC</u>					
12	Baie-Comeau	M	N/A	132.5	124.8	258.2
		F	N/A	67.1	71.4	40.2
13	Chicoutimi-Jonquière Group 1	M	189.0	185.2	199.9	224.8
		F	190.8	138.6	159.4	167.9
14	Chicoutimi-Jonquière Group 2	M	179.6	148.1	278.0	206.3
		F	161.4	130.4	146.3	157.1
15	Drummondville	M	161.4	95.2	186.9	173.8
		F	154.3	121.1	153.7	158.0
16	Granby	M	139.3	146.4	193.1	185.1
		F	176.0	167.5	150.4	141.0
17	Hull	M	245.4	195.6	188.1	181.2
		F	221.0	129.4	153.7	138.0
18	Joliette	M	262.9	263.2	201.9	236.8
		F	203.2	199.6	178.3	135.9
19	Montreal	M	195.0	198.0	214.7	213.7
		F	178.7	164.4	164.7	159.9
20	Montreal Group 2	M	226.0	154.1	180.0	195.7
		F	199.8	157.2	157.4	154.2
21	Montreal Group 3	M	660.7	382.8	203.8	181.8
		F	309.1	179.7	172.1	132.6
22	Montreal Group 4	M	118.0	122.0	144.9	203.2
		F	156.7	107.0	127.7	139.3
23	Montreal Group 5	M	721.3	164.7	177.9	187.6
		F	642.1	153.3	165.0	173.0
24	Montreal Group 6	M	N/A	137.2	233.6	160.0
		F	N/A	114.0	183.0	161.2
25	Quebec City	M	229.2	181.7	187.7	207.1
		F	204.2	148.9	146.8	145.7
26	Rimouski	M	153.9	215.9	173.1	172.0
		F	161.0	122.2	190.6	149.4
27	Rouyn	M	179.1	137.6	174.0	247.0
		F	95.6	123.6	128.2	153.0

Region Number	Region Name and Province	Sex	1956	1961	1966	1971
28	St. Hyacinthe Group 1	M	230.2	169.9	179.6	193.4
		F	237.2	154.0	176.4	157.0
29	St. Hyacinthe Group 2	M	N/A	N/A	196.2	69.0
		F	N/A	N/A	104.9	171.4
30	St. Jean	M	197.0	132.1	137.9	178.0
		F	206.9	129.9	153.0	137.2
31	St. Jérôme	M	158.9	140.4	172.7	199.8
		F	181.8	166.3	160.0	149.2
32	Shawinigan	M	152.8	167.1	176.1	217.0
		F	155.3	139.1	142.8	149.0
33	Sherbrooke	M	188.0	170.2	176.1	200.0
		F	183.6	169.0	152.3	142.2
34	Sorel Group 1	M	144.2	195.9	245.0	198.0
		F	130.3	141.8	174.8	159.9
35	Sorel Group 2	M	N/A	193.2	136.0	222.1
		F	N/A	137.4	93.8	169.2
36	Thetford Mines	M	213.2	135.0	171.9	226.9
		F	181.3	128.9	159.6	136.4
37	Trois-Rivières Group 1	M	162.6	173.6	172.2	235.0
		F	160.7	168.2	156.0	154.7
38	Trois-Rivières Group 2	M	168.0	152.4	192.8	209.0
		F	182.0	175.0	177.0	103.3
39	Valleyfield	M	120.0	132.6	157.2	189.7
		F	161.7	101.9	139.8	133.4
40	Victoriaville	M	198.8	135.7	196.4	201.8
		F	195.1	136.2	130.8	133.0
<u>ONTARIO</u>						
41	Barrie	M	155.2	155.4	119.3	152.1
		F	101.1	127.0	138.2	116.7
42	Brantford	M	145.4	128.7	186.1	158.8
		F	157.4	118.7	128.3	122.2
43	Guelph	M	130.1	158.7	135.2	151.1
		F	142.3	115.6	113.2	121.9

Region Number	Region Name and Province	Sex	1956	1961	1966	1971
44	Hamilton Group 1	M	167.7	161.2	172.8	182.0
		F	142.6	137.1	124.9	123.3
45	Hamilton Group 2	M	N/A	124.4	166.3	141.0
		F	N/A	125.0	130.2	135.6
46	Kingston	M	143.6	112.2	122.3	163.7
		F	117.3	102.2	114.6	114.0
47	Kitchener Group 1	M	125.8	140.9	152.9	152.9
		F	153.6	135.3	121.8	118.9
48	Kitchener Group 2	M	144.8	170.3	135.2	182.8
		F	109.8	145.8	123.8	132.9
49	Kitchener Group 3	M	N/A	133.9	153.6	150.0
		F	N/A	119.3	121.0	138.6
50	London Group 1	M	139.1	141.8	158.6	175.7
		F	129.1	120.4	124.2	125.7
51	London Group 2	M	137.9	155.1	148.9	184.4
		F	134.3	141.6	145.7	126.7
52	Oshawa	M	200.1	145.0	133.7	140.1
		F	148.0	131.0	132.2	129.7
53	Ottawa	M	164.4	138.7	159.9	157.2
		F	149.7	122.0	133.9	127.7
54	Peterborough	M	150.4	141.2	143.9	161.7
		F	117.8	132.9	108.2	110.0
55	St. Catharines Group 1	M	156.1	154.7	159.9	192.7
		F	141.3	113.6	143.2	122.0
56	St. Catharines Group 2	M	N/A	163.0	240.0	204.2
		F	N/A	178.6	169.1	126.9
57	St. Catharines Group 3	M	N/A	141.2	126.0	157.9
		F	N/A	157.3	140.7	148.0
58	St. Catharines Group 4	M	207.0	196.0	171.6	148.7
		F	158.2	140.9	131.0	112.9
59	St. Catharines Group 5	M	142.0	138.1	174.6	189.1
		F	159.3	108.1	118.4	113.2
60	Sarnia	M	160.6	133.0	138.1	160.7
		F	124.0	116.9	105.9	131.2

Region Number	Region Name and Province	Sex	1956	1961	1966	1971
61	- Sault Ste. Marie	M	169.9	175.8	153.4	179.1
		F	126.6	128.3	113.8	107.1
62	Sudbury	M	171.7	169.3	169.0	161.1
	Group 1	F	130.0	142.3	107.0	124.3
63	Sudbury	M	N/A	103.0	155.8	29.4
	Group 2	F	N/A	80.0	117.9	60.4
64	Sudbury	M	228.0	64.8	199.6	197.2
	Group 3	F	138.0	67.3	116.3	156.0
65	Thunder Bay	M	176.0	167.1	115.4	156.8
		F	111.7	135.1	76.6	109.2
66	Timmins	M	166.0	160.6	161.3	226.6
		F	112.0	145.0	130.4	160.1
67	Toronto	M	178.1	176.9	183.9	190.2
	Group 1	F	141.8	134.0	136.2	132.0
68	Toronto	M	242.0	162.8	175.6	173.0
	Group 2	F	228.7	137.8	136.6	133.2
69	Toronto	M	124.9	150.8	153.0	170.6
	Group 3	F	189.8	148.0	124.4	130.0
70	Toronto	M	139.1	140.3	153.3	152.4
	Group 4	F	176.6	142.8	106.0	121.1
71	Toronto	M	110.2	130.4	117.2	151.3
	Group 5	F	136.6	105.1	134.0	112.2
72	Toronto	M	N/A	N/A	N/A	151.3
	Group 6	F	N/A	N/A	N/A	112.2
73	Toronto	M	N/A	127.8	105.2	114.4
	Group 7	F	N/A	188.9	81.0	119.7
74	Toronto	M	201.3	95.4	116.9	140.9
	Group 8	F	275.4	91.0	109.9	123.1
75	Trenton	M	87.3	89.0	139.2	163.2
		F	76.7	92.8	113.0	123.0
76	Windsor	M	160.2	174.0	155.7	181.0
		F	141.3	130.4	120.6	122.0

Region Number	Region Name and Province	Sex	1956	1961	1966	1971
<u>MANITOBA</u>						
77	Brandon	M	82.1	120.0	145.6	159.0
		F	85.9	106.2	103.2	120.4
78	Thompson	M	N/A	N/A	135.3	167.4
		F	N/A	N/A	32.6	124.4
79	Winnipeg Group 1	M	154.0	169.9	178.0	232.0
		F	137.9	133.0	136.2	179.4
80	Winnipeg Group 2	M	118.6	105.0	143.4	89.3
		F	116.9	104.3	117.2	77.0
<u>SASKATCHEWAN</u>						
81	Moose Jaw	M	155.3	130.4	166.2	142.2
		F	115.3	140.3	98.2	111.4
82	Prince Albert	M	151.2	127.4	136.2	146.7
		F	132.0	110.7	85.4	111.7
83	Regina	M	151.2	144.0	151.3	169.2
		F	135.0	116.3	120.1	124.2
84	Saskatoon	M	137.3	137.4	145.1	155.0
		F	115.6	112.7	118.4	124.8
<u>ALBERTA</u>						
85	Calgary	M	146.8	132.0	147.8	151.0
		F	148.2	122.2	130.1	122.1
86	Edmonton	M	154.0	132.0	151.2	147.4
		F	132.3	122.2	124.0	112.4
87	Lethbridge	M	143.8	150.6	140.0	144.6
		F	132.1	125.8	118.0	91.8
88	Red Deer	M	195.0	124.0	113.3	135.6
		F	127.6	100.7	90.8	102.2
89	Medicine Hat	M	123.0	120.9	117.8	146.3
		F	117.3	108.8	156.8	107.7

Region Number	Region Name and Province	Sex	1956	1961	1966	1971
<u>BRITISH COLUMBIA</u>						
90	Chilliwack	M	198.9	133.7	139.8	148.8
		F	202.0	132.0	121.9	175.2
91	Kamloops Group 1	M	N/A	150.8	N/A	210.0
		F	N/A	149.3	N/A	146.5
92	Kamloops Group 2	M	N/A	N/A	N/A	18.1
		F	N/A	N/A	N/A	2.0
93	Kelowna Group 1	M	N/A	144.1	111.4	148.0
		F	N/A	98.3	118.9	121.8
94	Kelowna Group 2	M	N/A	N/A	N/A	N/A
		F	N/A	N/A	N/A	N/A
95	Nanaimo	M	N/A	N/A	N/A	78.9
		F	N/A	N/A	N/A	80.1
96	Port Alberni	M	N/A	120.6	165.6	131.2
		F	N/A	113.4	167.0	106.1
97	Prince George Group 1	M	185.9	148.6	158.0	155.9
		F	160.7	104.6	99.6	103.2
98	Prince George	M	N/A	N/A	N/A	7.7
		F	N/A	N/A	N/A	16.6
99	Vancouver	M	156.9	149.4	154.2	164.8
		F	135.0	127.4	125.1	123.6
100	Victoria	M	137.7	134.6	151.4	161.6
		F	136.7	126.9	125.2	128.7

N/A: Death rates not available due to small numbers compared with population, or because population figures were not available.

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